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Remarks

Thorough examination by the Examiner is noted and appreciated.

The claims have been amended to clarify Applicants disclosed and claimed invention.

Support for the amendments is found in the original claims and the Specification.

No new matter has been added.

For example, support for the amendments are found in Figures 4A-4D and Figure 5.

Claim Objections

Claims 15 to 18 have been amended as suggested by Examiner.

Claim Rejections under 35 USC 102(b)

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Claims 1, 2, 6, 7, 11, 13, 14, 15, 19, and 20 stand rejected under 35 USC Section 102(e) as being anticipated by Pierrat et al. (US 6, 852, 471) with Gelbart (US 6,593,064) providing a definition for claim 13.

Pierrat et al. teach a method for exposing multiple resist areas (shown to be a die area; see Figures 5-8) with a phase shift mask pattern **and** a trim mask pattern (see Abstract). Pierrat et al. teach that a problem to be overcome by their invention arises "from the need for two different mask patterns for implementation of a **layer of material** having small dimension features" (col 1, lines 60-64). Pierrat et al. teach that the disclosed invention overcomes the problem that arises when using different exposure conditions **with phase shift masks and binary trim masks** (col 2, lines 23-30), the problem being adjustment of the projection system between exposures.

Pierrat et al. additionally teach that a **trim mask** is "for protecting the pattern defined by the phase shifting pattern and **clearing phase shifting artifacts**" (see claim 1, col 9, lines 40-43; see also col 5, lines 2-5; "**complementary trim pattern**"; and col 3, lines 2-5).

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Pierrat et al. additionally teach that an advantage of their disclosed invention is that the optical setting of a stepper may be maintained constant between exposures for the phase shift mask pattern and the trim mask pattern **except for relative dosing**, which may be changed (see Abstract). One of ordinary skill would recognize the term dosing or exposure dosage (e.g., photon fluence) to be an integral of the illumination (radiation/area) (photon flux) over time (see e.g., col 3, lines 48-49).

Thus Pierrat et al. does not disclose several aspects of Applicants disclosed and claimed invention.

Pierrat et al. nowhere disclose or teach "exposing within a single die region within the photoresist layer"

Pierrat et al. nowhere disclose or teach exposing the single die region with "a minimum of two **non-overlapping die sub-patterns**";

Pierrat et al. nowhere disclose or teach exposing the two **non-overlapping die sub-patterns** "while employing a minimum of

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two masks, each of said masks associated with one of said non-overlapping die sub-patterns".

Rather, Pierrat et al. disclose and teach exposing **a layer of material** with a **phase shifting pattern** where substantially all of the features for a **particular layer** are defined using phase shifting (e.g., col 5, lines 40-44) together with the **binary trim mask pattern** (binary exposure) "for protecting the pattern defined by the phase shifting pattern and **clearing phase shifting artifacts**".

With respect to Gelbart, contrary to Examiners assertion, Applicants respectfully point out that Gelbart defines "exposure" (i.e., dosage), rather than "exposure energy" to be the integral of illumination over time. Thus, illumination may have a different energy, i.e., wavelength (also define in terms of energy (eV)), but the same dosage.

Thus, Pierrat et al. with Gelbart is clearly insufficient to anticipate Applicants disclosed and claimed invention.

"A claim is anticipated only if each and every element as

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set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

"The identical invention must be shown in as complete detail as is contained in the ... claim." *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Since Pierrat et al. with Gelbart fail to anticipate Applicants disclosed and claimed invention with respect to Applicants independent claims, neither does Pierrat et al. with Gelbart anticipate Applicants dependent claims.

Claim Rejections under 35 USC 103(a)

1. Claims 3, 8, and 16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat et al., above, in view of Schupp et al. (US 4,596,759).

Applicants reiterate the comments made above with respect to Pierrat et al.

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In addition, with respect to Pierrat et al., The disclosed operation of the phase shift mask and the trim mask of Pierrat et al. rather teach away from Applicants disclosed and claimed invention:

"exposing within a single die region within the photoresist layer a minimum of **two non-overlapping die sub-patterns** while employing a minimum of two masks, each of said masks associated with one of said non-overlapping die sub-patterns."

For example, the simulation in the method of Pierrat et al. in Figures 2 and 3 of the exposure of the **single pattern** in Figure 1 with a phase shift mask and a binary trim mask with different dosing clearly teaches exposure of **overlapping patterns**. The **overlapping exposure** of the binary trim mask of Pierrat et al. and the function of the trim mask is further exemplified in claim 1 which teaches that the **trim mask** "is further for protecting the pattern defined by the phase shifting pattern and clearing phase shifting artifacts", a process that cannot be accomplished by **non-overlapping patterns**.

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The fact that Schupp et al. teach a method for exposing and developing a resist layer having different strata of solubilities in a developer, where the resist may be formed over a ceramic substrate, even assuming *arguendo* a proper motivation for combination, such combination with Pierrat et al., does not further help Examiner in establishing a *prima facie* case of obviousness with respect to Applicants disclosed and claimed invention.

In addition, any modification of Pierrat et al. in an attempt to reproduce Applicants disclosed and claimed invention would make the method of Pierrat et al. unsuitable for its intended purpose.

"A *prima facie* case of obviousness may also be rebutted by showing that the art, in any material respect, teaches away from the claimed invention." *In re Geisler*, 116 F.3d 1465, 1471, 43 USPQ2d 1362, 1366 (Fed. Cir. 1997).

"If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification." *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed.

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*Cir. 1984).*

"Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure." *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

2. Claims 4, 5, 9, 10, 17, and 18 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat et al., above, in view of Wolf et al. (Silicon processing for the VLSI era Vol 1.).

The fact that Wolf et al. teach that either positive or negative photoresist may be used in optical lithography does not further help Examiner, in combination with Pierrat et al., in establishing a *prima facie* case of obviousness.

Applicants respectfully point out that "we do not pick and choose among the individual elements of assorted prior art references to recreate the claimed invention, but rather we look for some teaching or suggestion in the references to support their use in a particular claimed combination" *Symbol*



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*Technologies, Inc. v. Opticon, Inc.*, 935 F.2d 1569, 19 USPQ2d 1241 (Fed. Cir. 1991).

Based on the foregoing, Applicants respectfully submit that Applicants Claims are now in condition for allowance. Such favorable action by the Examiner at an early date is respectfully solicited.

In the event that the present invention as claimed is not in a condition for allowance for any other reasons, the Examiner is respectfully invited to call the Applicants' representative at his Bloomfield Hills, Michigan office at (248) 540-4040 such that necessary action may be taken to place the application in a condition for allowance.

Respectfully submitted,  
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